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Enrique: A case study of a gifted computer user

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I have been investigating the affective and intellectual views that gifted children have about computers. These studies have used various methodological approaches in order to develop a broad perspective on the issues involved in this topic. We have used survey instruments (Sesko, 1998) and interview techniques (Sesko, 1999) to capture both statistical and narrative data. The objective of this study is to explore in depth the interactions that one student has with the machine and its applications.

The driver for this and the previous studies was the paucity of research in the area of gifted and talented children and their involvement with what has become the primary intellectual tool of the century (Turkel, 1984).

The second reason is that it has been posited that the intellectual characteristics of gifted children should enable those who are interested in computers to achieve a high level of proficiency with either computer applications or programming. Further, the ability to learn things at a young age should allow gifted children who use computers to develop a large variety of computer-based activities. I have shown evidence to support these ideas in previous work.

Finally, as Hausman (1985) claims, facility with computers should allow these children to create new activities for using computers. I found no published research to demonstrate whether they do; but I believe the results of this case study strongly support Hausman's contentions.

The data come from extensive interviews and observations over time with a gifted Hispanic student. I also collected data by observing him at the computer and from reading his journals, book lists, and other written materials. I also interviewed members of his family to gain an intimate but "outside" perspective on the boy. Enrique was chosen from the group with whom the 1999 work was done. These data are not intended to describe all gifted children, nor all gifted children who are interested in computers. They are a detailed picture of one student who is not only highly interested in computers, but who is also extremely good at using them.

The research methodology followed standard case study procedures in interviewing, data synthesis, evaluation, and reporting. I followed the works of, Fine and Sandstrom (1988), McCracken (1988), Wolcott (1990), and Yin (1989).

I believe this study yields extensive data to support contentions made in the previous research (Sesko 1998, 1999). Gifted students who are extensively experienced in using the computer have constructed their own ideas of what computers are used for and what they are able to do with these machines. Though many of these uses are no different from the ones that other children and adults have found for computers, the study found some idiosyncratic uses and meanings. This student has taken computer use to a different level.

Because of his facility with the machine, Enrique indicates he has found new ways of working. These ways of working have both cognitive and affective elements. The cognitive is seen in the different ways he uses and thinks about the computer for school and personal uses. The affective element is seen in themes such as fun, social interactions, and rewards.

This work shows that this student believes that the computer allows him to learn and to accomplish tasks in ways that are unlike what is expected of him in school. He approaches the computer by exploring and by finding ways to fit it into his everyday life. As he says, the computer has "always just been there." It is like the telephone, the television, and other ubiquitous technology.

The research data from this study are presented in the form of a story, that is, extensive narrative descriptions that relate to the phenomenon of computer use by the participant. The story was edited from the three interviews conducted with the participant, along with comments on his journal entries, book lists, and comments from the adults who remarked on the student. Taken together, the data create a rich description of the interactions that the student has had with computers, from this first experience to the time of the interviews. It should be noted that for the sake of readability, the data have been severely edited, leaving out much of the natural language of the student. Hesitations, slang, and words of indecision have been deleted. Confusing grammatical constructions have, for the most part, been edited. In a sense, a lot of the emotion has been lost. I hope that what remains will allow the reader to view this boy as an individual, with different viewpoints, and who has different styles of computer use and learning. For this reason, some segments are presented at length, without commentary.

At thirteen, Enrique is a middle school student. He is nearly six feet tall--exceeding both his father and mother--with dark brown, tousled hair and hazel eyes. He is serious, quiet and reflective. He comes from a middle class family, his father being a professional, with some college education, but who never completed his degree in engineering. His father works as a systems programmer. His mother has a high school education and a paralegal certificate from a community college. Enrique has a younger brother with whom he works on computers.

Enrique is in eighth grade, his last year of middle school. This year he is taking algebra and advanced history, the only advanced classes available in eighth grade. He has selected German as his foreign language. His grades at the time of the interviews were all A's, except for a B in German.

Enrique is actively involved in Boy Scouts and he is very proud of his accomplishments in this area--20 merit badges, only two more for Life Scout, and five for Eagle. His peers have elected him to the positions of Patrol Leader and Senior Patrol Leader. He is a member of the Order of the Arrow, a group of elite campers, and he has been chosen for leadership training.

Music is another area of interest. He has had piano lessons, but has not continued with them. He has played clarinet for four years and bass guitar for two years. He is in his school's jazz band. Enrique recently joined the wrestling team at school. He also enjoys ice-skating and street hockey.

Enrique's interest in computers has been enhanced and maintained because of a parent's involvement in the computer industry. Here he talks about using the computer at home, where he had early experiences with programming and with applications. He is self-taught in most things, and he likes to explore. Enrique begins his story.

I've learned the most about computers and applications at home. I started using the computer when I was about six years old, on a Commodore 64. It was my Dad's computer. I got interested because he works in the software field. We had a computer at home, and it was kind of interesting to me. I started by

playing games. Then I started programming in BASIC, because the Commodore has it built in. The second you start up the computer you're in BASIC. So, that was interesting to me, too.

I'd write things. (Laughs.) Let's see. Well, it started out something like "line 10 print Alex," "line 20 goto 10" and then stuff like that. Then I would write things. I wrote a database program to keep addresses and phone numbers. Let's see, I wrote some games. From six to probably about eight years old. I think I was probably about eight when I did the database.

I started word processing when I was about six. I think I was using it for reports or something. It was real primitive word processing. I just basically used it for reports.

I learned a graphics program about the same time. I remember using *Geo's*, with *GeoDraw*, *GeoWrite*, all those programs. It was kind of like a *Windows* program, but really far back. That was probably one of my first experiences with drawing, writing. Well, I guess I kind of enjoyed it like using icons instead of names. I'd just kind of draw for fun.

I really began to work with databases when I was about eight or nine. I never really used them for anything that important besides phone numbers and addresses. (Laughs.)

I became interested in telecommunications about eleven. I think I was using it with my brother's computer. With the Commodore and with my old XT, which is my brother's now. I was hooking them together so I could communicate and stuff like that. It seemed better than just one computer. (Laughs.) I don't think I really found anything out. It was just kind of fun to transfer information, text files, and talk with the two computers. One was in my room and the other was in my brother's room.

Enrique shows that he found a use for his equipment that was perhaps unique for his age.

I remember when I had the Commodore; I used the joystick. I took a basketball backboard and put a switch in it so when the basketball went through the hoop it hit the switch and the computer could count the number of switches and keep the number of times the basketball hit and keep score. I think that was probably about fourth or fifth grade.

As he talks about his early experiences, Enrique brings up the topic of school.

The only time I really used computers in school was back east when we had a computer lab. I think it was five years ago. I was in third grade. We just played games and did math exercises. I don't know if it was where the computer graded you and kept your scores. I was about nine then.

He did, however, have a special computer teacher in elementary school.

We had a computer teacher in New Jersey. Our teacher would stay in her room while we went to the computer lab. I can't remember if the exercises we did in the computer lab related to the lessons I was doing in my classroom.

I think that the older students were allowed to use the lab whenever they needed the computers, probably about grades fourth through sixth. Third grade was my last year there.

When I first moved here, that was elementary school. I remember the

computer teacher was just a mother of one of the students. She didn't really know very much about computers. I thought the class was boring. We played games and did the typing instruction. Typing programs, exercises. I already knew how to type. It was boring. Access to the computer lab was just classes. You couldn't go after school, or at lunchtime, or recess.

What he says next is, perhaps, the best evidence that Enrique's school does not have a plan for how to deal with gifted students, or any other students, who excel at computers. Perhaps that is the reason that he concludes this topic in the way he does.

I used them in sixth grade. We had the computer lab. That was typing again and game programs. That's really all we did. I had to take the typing class. It was still a boring class. She knew that I already knew that stuff and everything, but she couldn't really change it for one student.

I haven't taken computer since sixth grade. I have other electives. In sixth grade it was required, but in seventh and eighth it wasn't. I'd have to drop my language or band, but I don't think so, because I can do the same things at home.

Enrique continues his story with a discussion of how he came to learn various applications and programming. He indicates how long it took him to reach his current understanding. He also discusses how he thinks he achieved his current understanding.

Enrique recognizes that it takes time and effort to become good at using an application or a programming language. While he probably underestimates the time it would take him to learn an application thoroughly, he knows that use and experimentation are necessary. Bloom (1986) has shown that automaticity can take years.

Enrique sees that he can make qualitatively different kinds of texts using the word processor. While this is certainly an example of amplification, it also shows that there is a difference in the thinking, as well.

Word processing, well, I can't type very fast, but I know how to use it. I can do anything, really. I mean I can do the titles and everything, and put in the graphics and all sorts of stuff like that. I don't know everything; there's a huge number of commands and everything. I don't know how to use everything. If I took the book and I read it, and I was using it constantly, and experimenting with everything, and working on it using macros, and all sorts of stuff like that. I don't know, it would probably still take a long time, maybe six months, if I was really working on it.

Well, a word processor could take drawing, and writing, and put it together, and editing basically. So I mean, it would take such a long time doing the drawings, and all the editing and everything by hand. It's incredibly fast with a word processor. Because it kind of puts everything together. So you can do your drawings with one program and just put it right in the word processor. That's what I do.

I think all word processors do the same thing. They are used for the same purpose. So, I don't think you really need knowledge of a specific word processor, although a lot of word processors have advanced options that you can't use unless you're familiar with that particular word processor.

Enrique's comments on graphics seem to be a good example of his moving

beyond amplification. The Christmas project seems to be unique for one his age. This activity not only shows creativity, but his realization that he can use the computer to give enjoyment to others beside himself. This episode is an example of what Clark (1991) calls the gifted child's ability to integrate experiences from the environment.

Graphics would probably be *GeoDraw*. I can't really remember. Well, you used a joystick. It was a lot different than using a mouse. It was kind of hard to draw with the joystick. It was a lot different than joysticks now. You'd move it one way, and go a little too far, and have to move it the other way, so it was kind of, it was kind of hard in that.

I can remember one year I took a whole bunch of my brother's and my drawings and we had a video card that you could run into a TV set. We recorded them on the VCR, a bunch of programs I had written for Christmas, and some music or something. Then we made a video tape to show my parents for Christmas.

Despite this creative use of graphics, his final statement shows what might be some ambivalence regarding graphics.

Oh, I can't do graphics. My brother's better at drawing than I am. I can just do the geometric stuff, using squares and erasing parts and putting them together. My brother can draw freehand and all that stuff.

Programming is Enrique's most important use of the computer. Enrique may not be exactly the kind of expert that Adelson (1981, 1984) and McKeithen and Reitman (1981) have described, but he seems to be learning a lot about programming, and the activities involved in doing programming.

My early experiences with programming were real simple stuff like Hangman. I wrote a program for dot racing, just four dots that would race around a track. It was random. I don't know, it was just kind of something I was just starting to get interested in it, I guess.

I learned BASIC, because, like I said before, it was on the Commodore. Well, I mean it was the only one I had, then *Quick BASIC* came, and then *Visual BASIC*. That's what I usually write a lot of stuff in. I'm self-taught in BASIC. Well, when I was a little kid, I guess my Dad showed me some things. I was little. Then I learned assembly. Oh wait, I learned Logo in there while I was doing BASIC. Well, in GATE we went once a week and we were taught about it.

I never learned by copying programs out of a book or a magazine. I think I tried that once, but I don't think that helps you learn anything, really. All it does, well I don't think it ever helped me learn anything. It's kind of just a way of putting off learning how to program, if you can just type in the commands, without ever knowing what they mean.

Well, I'd like to learn more. *Visual BASIC* pretty much covers everything I want to do with *Windows*. With DLL's, (Dynamic Link Libraries) which can be used by C or *Visual BASIC*. Any language that runs under *Windows* can use the DLL's to perform operations. Even though *Visual BASIC* may not be able to do something, the DLL's probably can. So you can do things like playing sound files, whatever. They're a collection of different procedures that you can call from any program.

Probably my Dad has had the most influence on my learning computers. Well, because he's involved in software. Using the computer and computer applications, that would probably be my Dad, because he brings home programs

he gets off of networks, and stuff at work, huge text files of all the different programming things.

I think school is probably a neutral influence. I don't think it has had any effect at all. In elementary school, I didn't really care for it. The class wasn't fun to be in. I don't know. My teachers don't usually talk about computers at all. School hasn't played any role in my learning of computers and computer applications or any role in my using computers and computer applications.

In the following section, Enrique discusses his perceptions of his own skill relative to peers, adults, and other things he knows. He also discusses whether he considers himself an expert. Again, Enrique repeats that it takes time to become good. His idea that he learns by doing is important and seems to be an indication of his epistemic foundation. Memorization and drill and practice do not seem to be his forte.

I don't know if I'm an expert user at word processing, but I'm probably better at databases than most of the other kids that I know. Well, I mean I'm not an expert, but if I had a database, I could use it. I don't really use them very much, besides just phone databases which are really easy to use. I'm probably better with the use of telecommunications than most of the other kids that I know.

I'm probably better at programming than most of the other kids that I know. No, none of my friends know how to program as well as I do. Except at my computer club. At least know how to program. An expert programmer, I don't know. Well, I mean, I think the more you work at it, the more programming you do, the more you learn. I still have a long ways to go in all languages. I mean there are all sorts of them.

I think being good at computers, that's knowing how to use it so that you can use it to the best. (Laughs.) I don't know. Well, I think an expert understanding would be an understanding of the complete hardware and the software of the computer. I'm just starting to get into assembly, and that's really where everything starts from. Then on the hardware side, I know just a little bit about electronics and stuff like that.

I probably know about as much as a lot of adults, maybe a little more. Somebody who's in the field of software or hardware would know more than me. (Laughs.) Well, I guess I'm good at computer. I think I know more than a lot of kids do. Adults? (Shrugs.)

Yeah. (Laughs.) I have a lot of confidence in my ability to use the computer. Well, I guess I wouldn't feel as confident if it was something completely new that I had never done before. I don't know, just like a completely new program, or a new language. So, I feel equally confident about my abilities with the computer when I'm with adults as I do with kids. No, my Dad knows a lot more than I do.

The next section comes from Enrique's real time interaction with the computer. He was working on a programming project. This is also the second time that he mentions using his programming skills for something for his family; it seems safe to assume that he does this kind of thing frequently. The section also indicates to what extent he is engaged in his use of computers and the level of skill he has developed over the years.

This is for my Mom for Christmas. It lets you edit all of the financial

bonds that you have. So, if you have a bond, you can make a file. Yeah, so you can make a file for each person in your family, if you wanted to, and have all of the bonds that they have with their name on the file. It's good to keep a record of this. I'm doing this program in Quick BASIC. I've been using it for probably about four years.

I knew with this particular program I wanted pull down menus. I knew exactly what information I wanted for each bond. I knew I wanted the name and number, date. I knew what type of interface I was going to use. The interface I had used, I really didn't like very much so I went back and wrote it in *Visual BASIC*. I liked it better under *Windows*.

All I have to do right now is write the menus. There's a lot of the program already done. I'd originally written a program to do the same thing, but it was using a different type of interface. It used the mouse, but there were no menus. There was a screen with an editor where you could look at all the bonds and all the titles and everything. Then on the right side of the screen, there were several buttons that you could click on with the mouse.

I think the first thing I did was make a box in the middle of the screen that I could display all the information in. I created a file for the bond information which was empty. Then I put in the pull down menu bar. Then I put the edit menu on the pull down bar. So the first thing I would do would be to write a sub-procedure to add a bond to the file. It puts a window up, and you type in the information for the bond. Then it adds that to the list, to that box. After doing that, I'd do a delete so I could delete the file. Then edit, so you could edit each field.

This is probably the most recent program that I've started. Well, I have my brother's Christmas present that I'm working on. Yeah, it's probably one of the most recent.

In the following sequence, Enrique is describing some of the work he is doing in the program. At first, it looked like he was deleting a large amount of material. This opening segment shows that he is very knowledgeable in what he is doing. It also shows that even though Enrique is beyond the age where he would think that a computer is alive, he still anthropomorphizes the machine, implying that "it" can know what or not know what the programmer wants to do.

I'm not taking out some of the old commands. No, what it was, I was using a quick library, because I had it working with the mouse and this version doesn't handle libraries.

This dialog box wants the type of file: APPEND, INPUT, OUTPUT, RANDOM. The problem I got there was that the file was empty. See, it says "input past end of file." So there was nothing in the file, and I was trying to input from it and it couldn't find anything. What I did, I just opened the file, yeah, and just put blank lines.

OK, and right there, I accidentally put "input" instead of "output", so when I tried to write to the file, it couldn't figure out what I was doing. What happened here was, I had some variables that were supposed to be shared between the sub-procedures, and it didn't let me do that. So, I had to change the variables to numbers.

Yeah, usually for commands and stuff, I refer to the manual. Cause there's a huge number of commands, over 200. It's easier to look for them than to

memorize them. Yeah, well I mean you memorize a lot of them, most of them. It's just that there are some commands that you hardly ever use.

Sometimes I'll have a question about a command or something. I'll wonder how I can do this. If I look, sometimes there's sample programs. You can look at the sample programs and see how they did it. You can duplicate that.

As Enrique continues work on his program, he discusses the way in which he approaches programming. Here, there are more indications of how mindfully he is involved with his work, and the kind of epistemic foundation that Enrique has established for himself. It seems that he does not see knowledge as a series of facts and skills that is built up in a hierarchy. Rather, it is something that is built and rebuilt; something that is constantly changing and developing.

Well, I've just been doing this program a few days, after school. I don't know. I just usually sit at the computer. I'll do something, maybe on *Windows* or something. And then I'll get bored of that. I'll go to my *Quick BASIC*, write something in there, then go back to doing something else. I mean there's always changes. You can always add more.

Let's see. A lot of times I'll start writing a program, and then I'll get bored and think of something better to do. I'll write another program. That's what happened on this one. I never completely finished it. And then I decided to go back and finish it. So, I have a lot of programs that I haven't finished yet. Not even finishing the program, but just working on the program, you learn a lot of techniques that will help you on other programs.

Well, I don't know what it is about a program that makes me want to finish it. A lot of things I wrote a long time ago when I didn't really know how to use the language really well. And so I never really knew enough to finish the programs. So now I can go back and finish them pretty fast. And then what happens is, you're writing it and then you find out that the stuff that you wrote on the program originally is kind of behind what you know now, and so you want to just change it around.

Enrique continues to work on his program. He gives more information about what he is doing. He shows an extensive knowledge of programming, but not enough to indicate his depth of knowledge.

Here when it prints a file menu, it was the way that it printed through the box, and it filled it in kind of slowly. The only way to get around that is to write assembly routines. You write a library in assembly and then it becomes a lot faster. Because in assembly you can just write to that exact position, almost instantaneously, that's how most programs are done. Eventually, I'll do that with this program.

Here, I have a mouse library at home that lets you use the mouse. The only way to do that is by using assembly, because there's no way to do it through *Quick BASIC*. They let you use other languages to tie in with your program. I think you can also write to C or something.

Enrique talks more about the way in which he approaches computer programming.

Well, usually I will have thought it through, and I know what I'm going to do. Sometimes I'll write down what I want the screen to look like, things like

that, the numbers, dimensions, and get that all written down. I didn't have any stuff written down for this program.

Yeah, I usually do planning for other projects, but not usually programming. Usually when I write the notes and everything I'll outline that completely, too, and the sections that I want the report to be in, science, or any other thing. Yeah, that would be the same idea. Like if I was going on a trip or something, I'd have my route picked out, the things I need to bring.

Usually when I have a programming idea, I've usually already thought about it by the time I sit down at the computer. It doesn't take long to get started. If you know what you have in mind.

I don't know what my most extensive program is. Most of the programs I write are usually application things that will help you. Usually the ones I do finish are shorter programs that I can use the techniques I've learned on. I wrote an application to launch programs. Things like that. It wasn't that hard. I did it in probably one day.

Because Enrique's ideas about computer languages are based on what he has learned by himself, they are still, in many ways, incomplete. He is not yet able to describe differences among languages accurately. His father remarked that this was a good way for Enrique to learn at this time in his life. His father believes that there is time enough for Enrique to learn formal computer science. When he gets the chance to take formal courses on the structure of programming languages, he will have the chance to modify and formalize his understanding. Enrique's comments show that he may not yet be at the expert level.

I guess learning a computer language is just like learning a whole, well, actually, it's not like learning a different language. Basically computer languages are usually all structured the same. It's just when you learn another language, you just have to learn the commands, and the structure's usually the same. No, not really. I guess there's, like in Logo and BASIC. Logo's really, it's more of where you can manipulate word lists real easily. In BASIC, you're not dealing with word lists. You're dealing with each letter in a variable. So instead, if you wanted to read the word, you couldn't just take that word out a list. Actually, I guess if you did the same thing you did in Logo in BASIC, you'd have to compare, a list in Logo, to an array.

I don't know, I just try other languages to see what they are. I mean, I don't have many languages at home. So, I'm kind of limited in that. But I don't know, maybe C, for doing more applications and then assembly you can tie in, writing libraries and stuff.

Debugging is an important idea in learning how to program. Here is how Enrique approaches it.

Yeah, I fix things right away. If something's not going to work no matter what I do, well, sometimes I'll just wind up starting all over again. It depends on what you are doing. I mean some bugs. It can just be it's printing the wrong thing in the wrong spot. Sometimes it can be locking up the computer every time you run it.

Usually *Visual BASIC* picks up all those typing errors, so you can't do it. It's helpful, because when it tells you, it gives you the format that you should be typing in. Every time when you type in something wrong like that, it will tell

you. So the next time you type it, you use the same kind of format. It's programming with a structure that you should use. Enrique continues with a discussion of how he feels about programming.

There is a strong affective element involved in programming for Enrique.

Yeah! This is fun. Usually when you have a program and it just kind of, kind of flows out. It's just really easy to do. Sometimes, when you have a program that's not working right, but then you figure out the solution, then that's when it gets really fun. The program is it's own reward when it goes well.

Probably programming is the most important to me, because all of those other applications stem from programming. Along the line there was somebody who actually wrote the applications and programmed them in. And if programming wasn't there, none of the other applications would exist. It's probably just like creating. Something new. I don't know. I guess it's just like building anything, like people who build cars in the garage or whatever. It's the same kind of thing.

In the following sequence, Enrique gives another indication that he looks at the computer as something more than an amplifier. A mode of expression, as he calls it, is much more plastic than an amplifier, and Enrique sees that it is something he can use creatively. It again shows that there is a strong affective component to his thinking.

Some people like to draw. Some people like to play music. And some people like to program, I guess. It's the same creativity, I guess, only being used in just different ways. I don't know. I also like to play music. I haven't combined those two ideas, not yet. But I was thinking about writing something. Well, I have programs that do that, though. So now I can record background music and play it back on my computer while I'm playing something else. So you can have a whole orchestra playing along with you.

I think being able to write your own programs is more important. Like that launcher I was talking about. I wanted something custom. I wanted something small, that I could do the same kind of things as *Windows* with. So I wrote my own custom program. You could have everything just the way you want it.

Sometimes my programming ideas are things I need. Sometimes it's some ideas I had that came from the Commodore. When I got the IBM, I wanted something like the Commodore programs, so I re-created some of those on the IBM.

The following comments on programming seem to be a common in other stories, as well.

I don't really think teachers think that kids can program things like I'm doing now, or that I have been talking about. I don't know. Most of the classes are pretty much just typing. Sixth grade was pretty much the last experience I had with computers.

No, I don't usually get bored programming. Sometimes if you're sitting there for a real long time, I mean you want to do something else. It's never really getting bored with the computer. It would be getting bored with what is your task.

As indicated earlier, Enrique is a serious student. His comments on usage are broader in scope, with fewer examples. He seems to look more at the capabilities of the applications, than he does at specific things he can do with the application. Enrique has an historical sense as well; it is subtle, but it shows up here and there. He commented on word-processing, graphics, databases, and programming. Enrique's general comments on computer use are interesting for their variety and originality. In the next section, Enrique describes some of the uses he has found for the computer and whether computers have caused changes in the way he approaches tasks.

For writing I'd probably choose the word processor. Well, I mean, everything looks nicer, and I think it's a little faster, if you want to change the word order or whatever.

If it was hand written, I'd think of an idea to start out the plot, maybe a lesson to teach, or an idea to get across, or some point to the story. Then I'd try to think of characters, or some way of getting the point across. Then I'd build the plot from that. With a word processor I don't think it would be much different. Probably, my mental processes would be the same. I don't know if my planning and organization would be the same with a word processor. I might not take time trying to be careful and making sure I get everything perfect on the first try. Using a word processor, I'd be able to write down my ideas and take whatever I need.

I remember I did a report. As I was reading, I would just type in notes on the lap-top. I took a disk from the laptop, put it in my computer, and I just filled in all the words. I had the whole report all done, and it barely took any time at all. (Laughs.)

Well, usually when I'm using a word processor, it's usually because I have a report to do. Or something like that. Usually when I'm programming, it's because I want to. And that's all the motivation, because you want to do something.

I wanted to write a German program to pretty much keep track of all that information. We have notebooks in school that have your verbs, your grammar expressions, all your vocabulary, all that kind of stuff. It would be easier if I could put it in a computer. Then I could go to certain parts, change them around, add things, then print out the whole list. It would be really easy to read. It's incredible. If you write it down, every time you have to add a word, you have to re-write it, but with a computer you could put it in alphabetical order. Then I could add parts that could test me on different sections.

I think I have more freedom to experiment and create. Yeah, well, a lot of things now, drawing, doing things like that. You can do a lot of graphical effects much easier than you could do on paper and do writing using different fonts, and that's a lot easier than if you wanted to draw them. The computer helps if you're not a good artist. You can still express what you set out to draw, what you're thinking in your mind. Even if you can't draw that on paper, you can use lines and circles on the computer. And you can draw that easier than most people. I've done that before.

I think it's a way to hold information. To access it quickly. It's faster than looking something up in a book. I think you can put things together. Like if you have the encyclopedia on the computer and cross-reference all the articles, like for a certain subject. Then bring that in your word processor or whatever and you cut and paste chunks out of that.

Well, things like doing a report. When you do a report you can take the picture and you put in the report. Yeah. I remember a report of Yosemite or something, and I took the picture of Yosemite in the document. It was clip art.

Well, it helps you. I guess you can show things artistically, drawing, things like that. You can write on the computer. You can use the computer to help people. By using programming to help people or to help yourself do things.

It is interesting how this futuristic theme carries throughout Enrique's comments. It also seems indicative of another aspect of the affective element of the computer in his life.

I'd like to do things like running robots and stuff out of the ports, but the chance of short circuiting the board--and stuffs real expensive --so it's kind of limiting. Because with the Commodore the switch was very simple and there wasn't much risk involved.

Enrique uses the computer as an amplifier, but he has also found ingenious uses for the machine. The basketball hoop idea mentioned earlier is not something that most children would think of at such an early age. His use of computer programs for Christmas presents seem unique.

Enrique has discovered, and makes use of, the versatility of the computer on his own. It has become a medium of expression for him. The computer is a way for him to use his creative energies in finding original problems and in solving them. Often, as in the case of the basketball hoop problem, the problems come from exploration and experimentation--"What would happen if..." kinds of things. These explorations have led him to deeper understandings of both the equipment itself, and the applications that he can use on the equipment.

In the next section Enrique discusses what has changed in his mind, because of his use of computers. This was a difficult topic for him to pursue.

Well, I mean, its kind of like wishing for a day when you'll have virtual reality. Having it work so well that you can have a robot, and you see and feel what the robot feels. But you're on the computer terminal and the robot's out there in the world somewhere.

Perhaps because the computer has always been a part of his life, it is difficult to think about change.

I don't know. I've never really done much without the computers, since I've been using it since my Dad got the first one. And that might have even been before I was six.

Enrique finishes his comments on change in the best way he is able--comparing what he does on the computer with what he does at school. To him, this difference is the change.

Well, I don't know, in school, if I'm doing something for German or something, it's different. Because if I was at home using the computer, I could just call up the information on a program or something. But in school, it's all, I have to memorize it. Or in school, you have to look things up in a thesaurus, when at home I can just look it up on a computer. And Compared to an encyclopedia in school, you can get on a CD ROM fifty articles on ten different volumes of the encyclopedia all on the same screen at the same time. Where in a

regular encyclopedia you couldn't do that cause you'd have the volumes spread out all over. The computer is more efficient. It allows you to organize better.

I don't know. In school I guess its more memorization and at home on the computer I can just program it into a lot of applications. I don't know. I guess the difference is one's probably easier. On the computer. Because I guess it's easier than looking things up, and the computer it probably would be faster. I mean you can store data faster and recall data faster than if you memorized it.

I just enjoy it really. I guess it's like a whole nuther (sic) world. And you can make it whatever you want. Change anything. I don't know. Programming games or anything, you can make the outcome whatever you want. Like drawing. If I draw something on the computer, it's not really there, but yet you can see it. You can see what it would look like if it was really there. I'm not sure. I don't know. I guess programming would be in there, too, cause, you can program applications to do things.

In this last section of his story, Enrique discusses what meaning computers have in his life. Again, he looks to the future, "What would happen if...."

If everybody knew computers, I think it would be easier to communicate with people. I think that people would write better reports. Things like that. Well, I think I could talk with other people about programming and things like that. There would be more information, because if everybody could use computers then everybody would be working on the same types of things. There would be more information.

I don't know what life would be like without a computer, because I've always had one. Well, I don't know, because I've never had to do anything without.

Enrique talks about computers and people. He shows that his family is very important in his computer life.

I don't think it is as important as people. It's a tool. It's not a replacement for people, because it can't think for itself. Everything it does is because you told it to do that. It can't really do anything on its own.

I don't think it has made any effect at all socially. I haven't made any new friends because of the computer, except at my computer club, no.

Well, my dad and I talk a lot about the computer. I'm always teaching my Mom things about the computer. I help my brother a lot, too. It kind of helps you get together, talking.

As he concludes his story, Enrique again looks to the future.

I know that when I get older, when I'm trying to get a job or whatever, I know that computer is going to be a very important thing. In the future, computers will play a very important role in, I think, practically everything. Like even sending electronic mail instead of sending mail. If everybody had a computer, like you wouldn't even need the post office to send mail, because it would all be electronic. So, I think they will eliminate a lot of things and replace them with computers.

The last comment seems to sum it all up for Enrique.

Well, if you can solve it with the computer, I'll use the computer.

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